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Web 3.0-Based Non-Formal Learning to Meet the Third Millennium Education Requirements: University Students' Perceptions

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Abstract

The paper provides integrated theoretical analysis of such phenomena as non-formal learning and Google-based Web 3.0 tools for education within a wide social context of the Higher education goals in the new millennium. The research goal is to explore university students' perceptions on Web 3.0-based non-formal learning with regard to the students' future performance on the labor market. The paper provides empirical analysis and interpretation of statistical data that reveal challenges that students might face when being involved in non-formal learning with Google-based Web 3.0 tools use, benefits that students might gain from being involved in the mode of learning under study. The research findings also prove that non-formal learning with Google-based Web 3.0 tools use is expected to contribute to the development of cross-curricular generic competences.

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1. Introduction

Scholars and policymakers have analyzed Higher Education perspectives in the third millennium within various conceptual frameworks, using various methodological approaches. The topic of the present research has been chosen due to increasing focus on the synergistic approach to higher education development (Seitz, 2009). The above approach aims to study and promote multidimensionality and integrity of education process, combining students' training, upbringing, education, and creative development through the educational institutions interaction with social agencies, industrial and commercial enterprises to provide the society sustainable development.

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The competences formation is one of the top education goals. Nevertheless, the views of Academia, Market, and Society often differ regarding possible learning modes and learning environments, as well as scope, priority sequence, particular knowledge, skills and abilities of university graduates. Taking into account the above, the preliminary stage of the research included its background drafting.

2. Research Background

2.1. Higher Education within the Third Millennium Goals

The third millennium has required defining and shaping the world community most urgent goals and targets that, in turn has led the UN to set the Millennium Development Goals (UNMD, 2000). Currently, the UN Member States are drafting the post-2015 sustainable development to be adopted at the UN Summit in September 2015. The respective list includes such objectives as "ensuring lifelong learning opportunities for all, promoting sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all" (Post-2015 Sustainable Development Agenda, 2015). International documents, national legislations and research publications across the world evaluate the human capital as the key determinant for the world sustainable development. The above framework requires higher education institutions to respond to the Post-2015 agenda by addressing international and national needs to champion human development, to foster individuals´ professional competencies. These issues are considered across the continents (Hirsch & Weber, 1999; Roberts & Ajai-Ajagbe, 2013).

Both scholars (see, for instance, de Weert, 2011) and authorized agencies of international organizations (see, for instance, Improving knowledge…, 2007) point out that sustainability requires close and multidimensional interaction between education and research, on the on hand, and industry, on the other one. The interaction could help identify those up-to date competencies that university graduates are expected to have in order to meet the labor market requirements.

2.2. Graduates' Competences and Employers' Requirements

Past years witnessed rather different approaches to competences classification. J. Delor (1996) viewed such competences as "learning to know, learning to do, learning to live together, and learning to be" as four pillars of education. Meanwhile, the European Parliament and the Council of Europe (Recommendation 2006/962/EC) focused on competences in mother tongue and in foreign languages, digital competence, mathematical competence and basic competences in science and technology, learning to learn, social and civic competences, sense of initiative and entrepreneurship, cultural awareness and expression. The research under the Tuning project (Generic Competences, 2000) has led to a detailed list of abilities, capacities, knowledge, commitments, determinations, etc. The Strategic Framework for European Cooperation for Education and Training has underlined the topicality of cross-curricular competences among which special emphasis is laid on social cohesion and active citizenship, enhancing creativity, innovation and entrepreneurship (for details see: European Council, 2009).

A similar approach is revealed in the Russian legislation and strategic educational framework (On Education in the Russian Federation, 2012; Concept of Long-term Socio-Economic Development…, 2008).

Researchers underline that currently the employers focus on graduates' generic competences (Quek, 2005). Employers are in search of university graduates who can produce knowledge and innovations that are tailored to particular creative enterprise needs, who can accumulate social net working for professional purposes, who are able to adapt to a constantly changing professional performance environment by using the overall potential of the information and communication technologies (ICT) (Hair, Bush, Ortinau, 2006). Enterprises and agencies strongly complain that graduates lack critical thinking, problem solving and creativity skills, adequate information processing and management abilities, etc., there is less dissatisfaction regarding graduates' professional knowledge and skills (Archer & Davidson, 2008; Paterson, Jackson, Grieve, 2012; Super Job Poll, 2011).

Thus, it seems to be of current importance to follow those researchers, who underline, that "the university…belongs to society, that the process of teaching/learning experience is not just a theoretical exercise of abstract knowledge, but a crucial act of training, leading to the development of skills in the labor market for qualified graduates" (Urs & Sorin, 2011, p. 342). The above scholars underline that "University prepares graduates

for life, existence and knowledge needs, regardless of the career field they develop" (Op. cit.). What is more the authors further specify that "…against this philosophy a modern managerial vision should come as a priority, turning the university into an institution open to society, inclusive and responsive, transparent …" (Op. cit.).

2.3. Education in the Digital Age: Focus on Social Dimensions and Human Interaction

We live in the digital age of "rising connectivity that reshapes traditional routines and offers new paths for learning" (Schmidt & Cohen, 2013). Thus modern ICT are intensively explored from the angle of their potential contribution to making the university a kind of social agent that could meet the expectations of the society in terms of enhancing those students' skills that employers view as not developed enough.

During the current decade there has been active research followed by the hot discussions on the transition from Education 2.0 (the term was introduced by S. Downes in 2005) to Education 3.0 (comprehensive analysis provided by J. Lengel in 2012) by comparing technological advances and social dimensions of various Web services and applications. The term "Web 2.0" is known to specify the web modern power from its original potential ("Web 1.0"). Web 1.0 allowed users to passively accept the content provided by a narrow bulk of authors. Web 2.0 allows many users generate, share and develop the content by using a varied set of technologies (including YouTube, messaging and chat, RSS feeds, Podcasts, blogs, online grading, quiz and assessment tools, social networking and publishing). Scholars agree that the above technologies are widely used for educational purposes (Anderson, 2007; Bell, 2009; O'Reilly, 2005).

Nevertheless today, scholars outline features of a new stage that is viewed as Education 3.0 associated with web 3.0 technologies. The above stage is characterized by a sharp advance in 3D technologies, semantic web and cloud services (Morris, 2011). Nonetheless, when explaining the specifics of the above Education 3.0, scholars also point out a number of distinctive features related to the above technology social dimensions.

Thus, D. Keats and J.P. Schmidt (2007) specify the following. First, the role of professor changes from providing knowledge and guiding students in terms of its processing to organizing the creation of knowledge by students that is individually meaningful and collaboratively created. Second, the nature of content changes as it moves from copyright and free/open educational resources *for* students to free/open educational resources created, shared and modified for personal use *by* students themselves. Third, learning activities change from traditional assignments based on more open technologies to self- and community regulated flexible learning activities that focus on creating room for student's social networking, interaction and creativity. Fourth, "going between passive and active approaches" student's behavior turns into a strong sense of ownership of one´s own education, co-creation of resources and opportunities, active choice. What is more, J. Gerstein (2014) underlines, that the meaning is contextually recreated, and there are more trajectories for co- constructivism. The above analysis reveals Education 3.0 social focus and specifics and proves the urgent necessity to integrate Education 3.0 principles and tools into the Higher education institutions curricula.

2.4. Non- formal Learning within Higher Education

Education policy, theory and practice traditionally distinguish formal, non-formal, and informal learning. Formal learning (FL) is realized at educational institutions according to the academic program curriculum; it starts by the learner's initiative, it is structured by an institution according to the national educational standards and ends up with a degree or qualification. Informal learning (IFL) occurs within learner's everyday life activities and it neither is organized nor is expected to lead to degree or qualification though researchers recognize its potential for professional development (Latchem, 2014).

As far as non-formal learning is concerned, it "is shaped as systematized, structured and organized activities that are addressed to a particular subgroup of social community" (Coombs & Ahmed, 1974, p. 8), and provide learners with alternative sources in contrast to those recommended within the formal learning system (Cushion et al, 2010). Non-formal learning potential has been studied and promoted by a number of international organizations including UNESCO, Organization for Economic Co-operation and Development, European Center for Development of Vocational Training (Cedefop), European Trade Union Institute, etc.

Scholars explain the current increasing interest in the non-formal learning by the fact that this mode of learning mostly reproduces real professional world situations (Werquin, 2010, p. 5), that in turn, makes it of current importance to advance the research in the relevant field.

There is a considerable amount of documents drafted and adopted by international organizations, regarding instruments for recognition and validation of non-formal education (see, for instance, activities by Cedefop). Researchers explore methods and current practices in the field of non-formal learning across countries (Bukina, 2010; Novosadova et al, 2008; Rojtblat, 2013). Nonetheless, only few publications state that the non-formal and informal elements should be integrated into the formal education to meet the needs of individuals and society (Zaki Dib, 1988, p. 9).

The above research background analysis has allowed the authors to formulate the research hypothesis and goals integrating such issues as the third millennium higher education goals, employers' requirements, non-formal learning within formal higher education, and social advantages of Web 3.0-based learning environment.

2.5. Objectives, Methodology and Research Design

The research background has paved the way to state the following hypothesis: Web 3.0-based non-formal learning when incorporated into the academic curriculum can contribute to students' social development and confidence regarding their future performance on the labor market.

The research objectives resulted from the above hypothesis and aimed to answer the following questions:

- How could university students' perceptions on non-formal learning with Google-based Web 3.0 tools use change through learning, what does possible change depend on?
- What challenges could students face when being involved in non-formal learning with Google-based Web 3.0 tools use?
- How could students benefit from being involved in non-formal learning with Google-based Web 3.0 tools use?
- Could non-formal learning with Google-based Web 3.0 tools use contribute to the development of cross-curricular generic competences?

The answers to the above questions were supposed to meet the overall research goal that is to explore university students' perceptions on Web 3.0-based non-formal learning with regard to the students' performance on the labor market.

The research methodology included a number of activities, namely literature review, the observation and evaluation of university students' non-formal learning against the formal learning curriculum, students' survey, statistic data processing, research findings discussion.

The experiment took place at three Moscow universities, Peoples' Friendship University of Russia (Moscow) being the hub university. Totally 322 students were engaged in the experiment. Students came from 33 countries, representing Europe, Asia, Africa, and Latin America.

Following the set standards (Reason, 2003), the parameters for identifying statistically significant differences included students' origin (small town / large city, country, continent), socio-economic background (family income), gender, cultural affiliation (Asian / Western culture), age, year of studies, and field of formal education.

Non-formal activities included students' participation in students' conferences, contests, theme-focused events, volunteer projects and other social activities (consulting newcomers, accompanying foreign delegations, etc.). It should be mentioned that students participated in most activities, using either Russian as a foreign language or English, Spanish, German, French (students from the Russian Federation and CIS countries).

As for technology, Google Apps were used within a Google cloud that was created as a cloud uniting students of a concrete faculty and year of studies.

Students used a number of Google Apps including Gmail, Docs, talk, groups, sites, video, calendar, etc. Shared Google docs provided the opportunities for collecting, analyzing and sharing data, allowed to create the repository of materials for events, contributed to event planning (along with Google calendar), to keep records of meeting notes for further discussions, publish prepared materials, translate materials in different languages. Groups were created for mini team performance, taking into account students' aptitude to various activities, level of foreign language master, etc. Spreadsheets helped to track everyone's participation and the overall team readiness for events. Forms were used to collect surveys, administer the preparation and evaluation of materials and collect their

observation feedback, to moderate and keep track of sources and group member referrals. Slides allowed students to collaborate when creating slides for their team projects and events. Sites were used to create students e-Portfolios, submit projects, and rise publicity over a concrete event. Google Drive allowed students to store and access large multimedia data for events and volunteer projects. Goggle Moderator allowed students to read each other's reflection, discuss them and vote up. Talk contributed to permanent communication and consultation. The above Google Apps are widely used in this way in business and there are blog publications regarding Google Apps for formal education, though there is no evidence in research publications about the Web 3.0-based Google Apps for non-formal learning.

Open-ended questionnaires were conducted at the schooling year-end within two-year-long period to identify students' perceptions on Web 3.0-based non-formal learning with regard to their performance on the third millennium labor market.

Students were asked the following questions during the 2-year period of their academic studies:

- What is your attitude to Google-based Web 3.0 tools for non-formal learning? Positive/neutral/negative, Why?
- Did you face any challenges using Google-based Web 3.0 tools for non-formal learning? Why?
- Did you get any positive skills/experience for your future work using Google-based Web 3.0 tools for non-formal learning? Why?

Statistic data processing included cluster analysis and factor analysis. The independent t-test was used to determine statistically significant differences. SPSS was used for statistics data processing.

3. Research Outcomes and Discussion

3.1. Changes in Students' Perceptions through Learning

The students' attitude to Web 3.0 tools use for non-formal learning activities was measured through out the 2-year period of academic studies. The cluster analysis revealed the positive dynamics in clusters that characterized students who expressed positive attitude to the above technology use (Fig. 1).

The above factors percentage revealed no respondents' particular views depending on respondents' gender ($p>0, 01$), cultural ($p>0, 01$), ethnic attributions ($p>0, 01$), social background ($p>0, 01$), family income ($p>0, 01$), field of formal education ($p>0, 01$). Although such parameters as the year of studies ($p<0, 01$) and the small town / big city origin turned out to be statistically significant, students from small towns did not like virtual preparations for social and professionally oriented events beyond the class room and preferred face to face discussions and collaboration ($p<0, 01$).

The above figures might be explained in the following way. The more students are engaged in Web 3.0 Google-based non-formal learning the more they get aware of the benefits thereof, as they are acquainted with both the opportunities the technology offers and their peers' particular abilities, behaviour, etc. This situation contributes to positive dynamics in students' perception of the technology use for non-formal learning.

As far as the parameter of students' origin from a small town / big city is concerned, it seems possible to interpret the data by taking into account students' explanations according to which they have spent a lot of time on the web when living in a small town and training to enter the metropolitan university where they value face to face interaction with enormously varied community in terms of its socio-cultural profile.

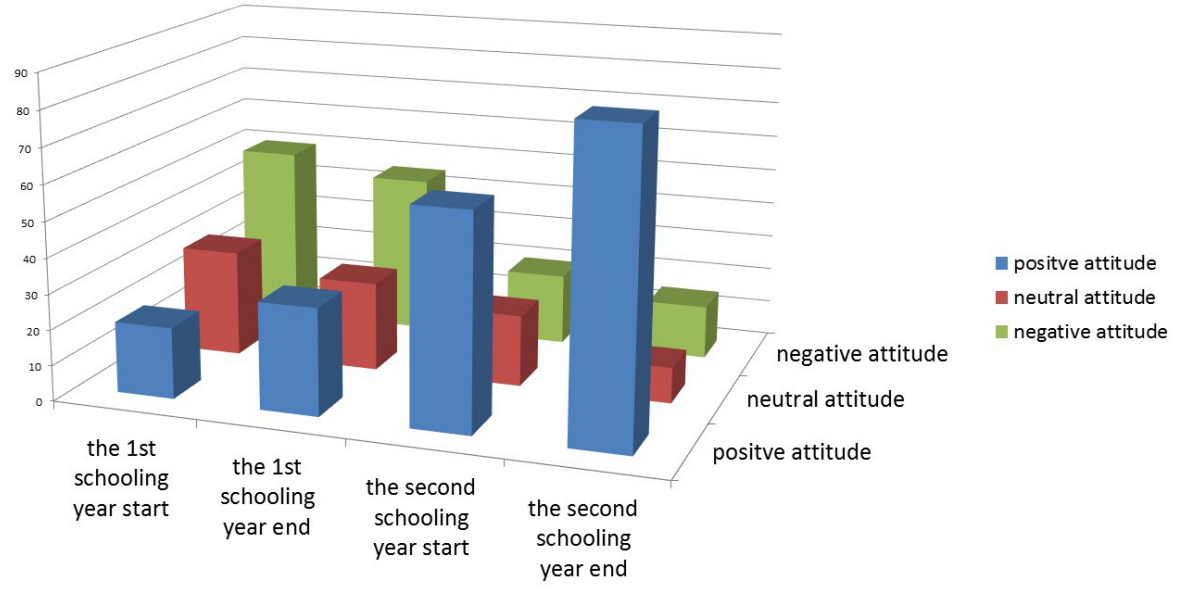

Fig. 1. Dynamics in clusters that characterized students' attitude to Web 3.0-based non-formal learning

3.2. Challenges that Students Face when Being Involved in Non-formal Learning with Google-based Web 3.0 Tools Use

The factor analysis at different stages of the experiment has revealed those challenges that students faced when being involved in Web 3.0 Google-based non-formal learning.

1st factor – foreign language use issues (0.891), the item was mentioned by 89% of the respondents during the 1st schooling year start, by 63% of respondents at the year end, for the second year end the item was marked by 15% of respondents; the above factor percentage revealed no statistically different characteristics regarding respondents' profile, except for the year of studies.

2nd factor – lack of awareness regarding integrated use of technology (0.712), 70% of respondents mentioned the item during the 1st schooling year start, the item was not marked in further surveys; the above factor percentage revealed no statistically different characteristics regarding respondents' profile.

3rd factor – team members' different level of aptitude for technology use in non-formal learning (0.701), the item was mentioned by 70% of the respondents during the 1st schooling year start, by 43% of respondents at the 1st schooling year end, by 35% of the respondents during the 2nd schooling year start, by 13% of the respondents at the 2nd year end; the above factor percentage revealed the year of studies, gender and geographical origin as statistically different characteristics regarding respondents' profile.

4th factor – lack of teacher's guidance, lack of teacher's presence and monitoring (0.681), the item was mentioned by 69% of the respondents during the 1st schooling year start, by 36% of respondents at the 1st schooling year end, by 33% of the respondents during the 2nd schooling year start, by 11% of the respondents at the 2nd year end; the above factor percentage revealed the year of studies, cultural background ($p<0,01$) and geographical origin ($p<0,01$) as statistically different characteristics regarding respondents' profile.

5th factor – lack of awareness of the potential and importance of non-formal learning (0.669), 67% of the respondents mentioned the item during the first schooling year start; the item was not marked in further surveys.

6th factor – "vague" information regarding the connection between non-formal learning activities and the real professional world (0.621), the item was mentioned by 61% of the respondents during the 1st schooling year start,

the item was not marked in further surveys; it reveals the year of studies as only statistically significant parameter for the factor.

7th factor – lack of information on assessment and evaluation of non-formal activities within formal academic curricular (0.617), the item was mentioned by 61% of the respondents during the 1st schooling year start, the item was not marked in further surveys.

8th factor – excessive offer of potential sources makes the information selection and processing very time consuming (0.601), the item was mentioned by 60% of the respondents during the 1st schooling yearend, for the second year end the item was marked by 13% of respondents; thus, the only statistically significant parameter was again the year of studies.

9th factor – lack of information specifying how non-formal learning could match the employers' requirements relating to various skills (0.534), the item was mentioned by 53% of the respondents during the 1st schooling year start, the item was not marked in further surveys; the above factor percentage revealed no statistically different characteristics regarding respondents' profile.

Summarizing the above data it should be underlined that that the experiment revealed three critical challenges regarding non-formal learning with Google-based Web 3.0 use. The topical questions included foreign language use issues, team members' different level of aptitude for technology use in non-formal learning, and the level and scope of teacher's guidance.

The language mastery was not sensitive to any parameters except for the year of studies, while the situation turned out to be different regarding the other two factors. Statistics proved that team members' different level of aptitude for technology use in non-formal learning was statistically significant for such parameter as gender (p<0, 01, mentioned more by male students), and geographical origin (p<0, 01, mentioned more by students who came from small towns).

As far as the teacher's guidance, presence and monitoring are concerned, according to statistics the above issues were statistically significant for such parameter as cultural background (p<0, 01, mentioned more by students who affiliated themselves with Asian culture), and geographical origin (p<0, 01, mentioned more by students who came from small towns).

3.3. Benefits for Students from Being Involved in Non-formal Learning with Google-based Web 3.0 Tools Use

The factor analysis has led to the following list concerning the students' positive experiences and benefits related to the mode of learning under study:

1st factor – student's involvement in real world professional situations (0.711 for the 1st year-end survey), the item was mentioned by 71% of the respondents, (0.998), 99% of the respondents mentioned the item at the end of the 2nd year-end.

2nd factor – opportunities to choose and follow an individual path of formal learning activities (0.611 for the 1st year-end survey), the item was mentioned by 62% of the respondents; (0.931), the item was mentioned by 92% of the respondents at the end of the 2nd year survey.

3rd factor – opportunities to develop communication skills in a foreign language to interact with peers and professionals in "real professional world" settings (0.531), the item was mentioned by 53% of the respondents at the end of the 1st schooling year, (0.844), the item was mentioned by 84% of the respondents at the end of the 2nd schooling year.

4th factor – opportunity to discover and get access to wide range of ICT sources that matter in terms of creating individually meaningful professional knowledge in a foreign language (0.549), the item was mentioned by 55% of the respondents at the end of the 1st schooling year, (0.814), the item was mentioned by 81% of the respondents at the end of the 2nd schooling year.

5th factor – opportunity to get teacher's advice and guidance tailored to student's particular needs (0.491), the item was mentioned by 49% of the respondents at the end of the 1st schooling year, (0.793), the item was mentioned by 79% of the respondents at the end of the 2nd schooling year.

6th factor – opportunity to use shared knowledge that focuses on future profession (0.329), the item was mentioned by 33% of the respondents at the end of the first schooling year, (0.817), the item was mentioned by 82% of the respondents at the end of the 2nd schooling year.

7th factor – the mode of studies helped to discover personal abilities regarding social interaction, argumentation, adaptation to the team needs, planning skills, analytical and self-control skills, abilities to start initiatives and take decisions (0.313); the item was mentioned by 30% of the respondents at the end of the 1st schooling year; (0.813), the item was mentioned by 81% of the respondents at the end of the 2nd schooling year.

The above factors percentage showed no respondents' particular opinions with regard to students' socio-economic background (family income) (p>0, 01), age (p>0, 01), field of formal education (p>0, 01). Nonetheless, the above factors revealed as statistically significant such parameters as students' origin (small town / large city, country, continent), gender, cultural affiliation (Asian / Western culture), and year of studies.

It should be noted that the longer students were engaged in the mode of learning under study the more they discovered its benefits and evaluated them as the statistics on all the six factors shows.

What is more, especially students from small towns, female students and students who affiliated themselves with Asian culture valued the opportunity to get teacher's advice and guidance tailored to student's particular needs at the 1st and 2nd year end (p<0, 01).

The statistical analysis also reveals that the list of challenges that students faced went down through the period of experimental non-formal learning. Meanwhile, the list of benefits that students identified went increasing in terms of the percentage of the respondents who mapped the respective positive experiences. Besides, the above positive experiences concern primarily the development of generic skills and cross curriculum competences.

It seems possible to recommend teachers to take into account students' origin, cultural background and gender when organizing non-formal learning activities with Google-based Web 3.0 tools use. According to the data, students who come from small towns or those who affiliate themselves with Asian culture turn out to be more sensitive to the teacher's personalized attention. Male students are more demanding with regard to technology use.

4. Conclusion

The experimental research has revealed that the non-formal learning with Google-based Web 3.0 tools use within the formal academic curriculum allows the institutions, teachers and students to create conditions for the most complete disclosure of each student's personal potential, his/her entrepreneurial skills regarding the overall professional self-education, the ability to make responsible decisions in the situation of choice by using the overall set of Google-based Web 3.0 tools to access analyze process information and respond to individual and collective data representing the repertoires of knowledge creation and its reinvention in particular contexts by particular user groups.

The mode of learning under study integrates students into a teaching process as a shared knowledge creation process and thus contributes to developing students' self-diagnostic abilities, to fostering their motivation for social interaction in quasi professional contexts, to enhancing learners' reproductive, productive, reflective and strategic skills, helps students improve their abilities regarding self-control.

Both the findings of students' perceptions analysis and everything mentioned above in the section prove that Web 3.0-based non-formal learning when incorporated into the academic curriculum contributes to meeting the third millennium education requirements, to developing cross-curriculum generic competences, to enhancing students' social development and fostering self-confidence regarding their future performance on the labor market.

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